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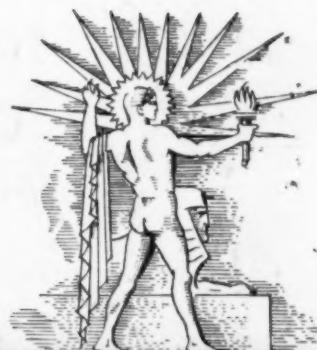
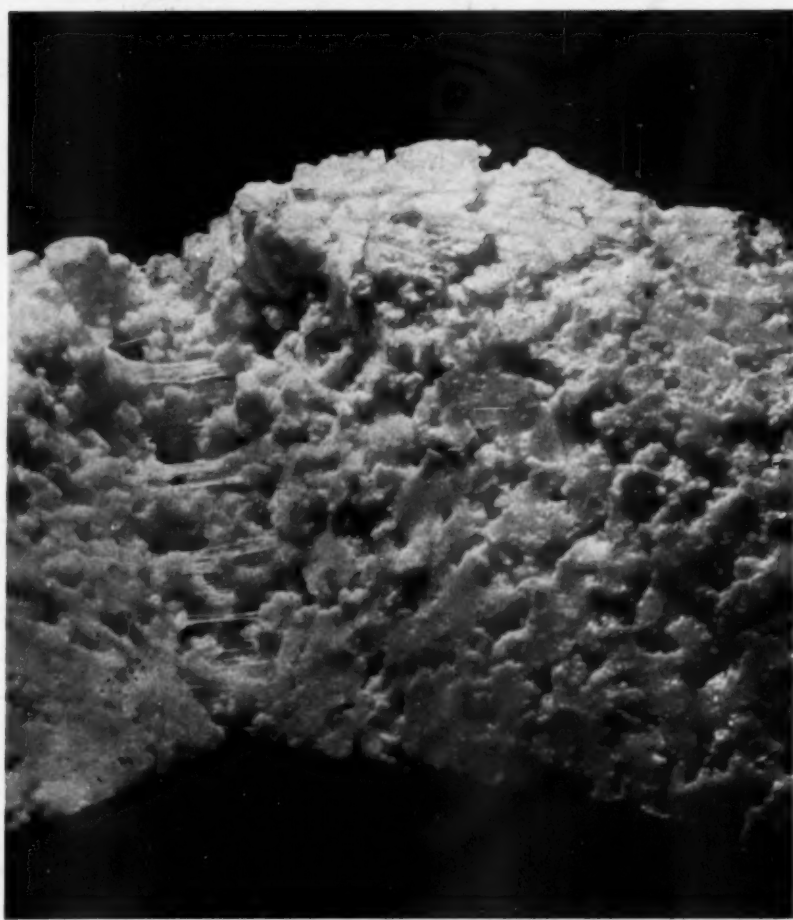
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# SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



September 21, 1940

Synthetic Rubber

See Page 179

A SCIENCE SERVICE PUBLICATION

## Do You Know?

About 4,000 acres of flowers and vegetables are under greenhouse glass in the United States.

That *Spanish* be a *required* subject in U. S. public schools is advocated by a Texas Congressman.

Slow-moving "pedestrians" of the sea, certain types of *sharks* have been known to be impaled on the prows of ocean vessels.

City *dumps* of today, like trash heaps of the past, preserve valuable evidence of the state of a civilization, for later archaeological study.

Treated with zinc chloride by a new method evolved by government scientists, *fence posts* last 10 to 15 years longer than untreated posts.

By rigging up an *electrocuting* screen for flies, a government fish hatchery has rid itself of these pests and by feeding the flies to the fish, has cut down feed bills.

This converted one western farmer to soil conservation: he came across an old mowing machine buried in 28 inches of soil that had washed off his crop land in 27 years.

In order to hatch and destroy any *moth eggs* lurking in stored furs, an Oregon storage plant sets the temperature at 33 degrees Fahrenheit for 14 days, then 60 degrees for six days, then drops to zero for one day.

## QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.

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### PSYCHOLOGY

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Why are bright babies born in the spring-time? p. 184.

Why are the odors in a political meeting place important? p. 184.

### PSYCHOLOGY—AERONAUTICS

How can scientists learn just how tense student pilots are? p. 184.

How can the effect on vision of lack of oxygen be counteracted? p. 185.

### VOLCANOLOGY

What warning may be given by a volcano of its eruption? p. 185.

Canning edible green *soybeans* is a new venture in the national food industry.

The native *cabbage rose* of Europe has been grown for more than 2,000 years.

Thirty strawberries or a small portion of cole-slaw provides a day's ration of *vitamin C* for an adult.

*Air conditioning* has become increasingly in demand in *India* since the war, mainly because Europeans take fewer vacations abroad and are inclined to spend more money on home and office cooling.

The Fahrenheit scale for *thermometers* was devised about 1720; the Centigrade scale about 1742.

More than 200,000 *horses* were used by the German army in its Polish conquest, a German official estimates.

Grading tiny ball bearings is highly important in *aircraft* shops—a hundred-thousandth of an inch makes a difference.

Government chemists have discovered that treating vanilla beans with *ethylene* gas speeds up curing and improves the vanilla extract.

## SCIENCE NEWS LETTER

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CHEMISTRY

# Synthetic Rubber Made From Waste Oil Refinery Gases

## Butyl Rubber Can Be Produced In This Country In Unlimited Quantities When Facilities Are Ready

**B**Y MAKING it as a chain of molecules to which only a very limited number of additional links can be added, American chemists have been able to produce from oil refinery gases formerly wasted a synthetic rubber-like substance with many advantages over imported natural rubber.

Speaking before the 100th meeting of the American Chemical Society at Detroit, Dr. Per K. Frolich, director of the chemical division of the Esso Laboratories, Elizabeth, N. J., gave the first technical report of the new "butyl rubber," developed after ten years of research by Standard Oil chemists. It is colorless, odorless, tasteless, and more stretchable than rubber from trees.

In his address, prepared in collaboration with R. M. Thomas, I. E. Lightbown, W. J. Sparks and E. V. Murphree, Dr. Frolich stated that butyl rubber can be produced in this country in unlimited quantities as soon as necessary plant facilities are available, thus making us independent should our supply routes of natural rubber from the East Indies and Africa be cut. At present butyl rubber is being produced in a semi-commercial pilot plant in quantities sufficient for tests of its usefulness for defense and other purposes, made at the request of the Army and Navy Munitions Board.

Secret of the superiority, in certain respects, of the new product over that made by nature is in the chain-like molecules of which each is made. These, in natural rubber, give elasticity but not great strength. Vulcanization, however, causes these molecules to react with sulfur so that, without themselves being greatly altered, they are linked together into a firm structure.

### Extremely Polygamous

The rubber molecules are extremely polygamous, for even after being married in the vulcanizing process, they still want to join others. They will combine with oxygen from the air, for example, and this causes deterioration of rubber with aging even though it is not in use. The chemist calls this willingness of the molecules to marry others "unsaturation."

The butyl rubber molecules have just enough unsaturation to permit them to combine with sulfur for strength. Then they are satisfied, and do not tend to react further.

Dr. Frolich explained it this way:

"Nature's rubber molecule and all its synthetic semblances are either wholly or predominantly polymers, or multiples, of much smaller molecules which belong to a class of highly unsaturated compounds called diolefins. It is to this diolefinic origin that the natural and synthetic rubbers owe their extreme degree of unsaturation and resultant chemical reactivity.

"Chemists working on rubber have been inclined to associate the elasticity and other important physical properties of rubber with its chemical unsaturation. Chemists in the Esso Laboratories, however, in their studies of chain-like polymers with no residual unsaturation, recognized a majority of these important

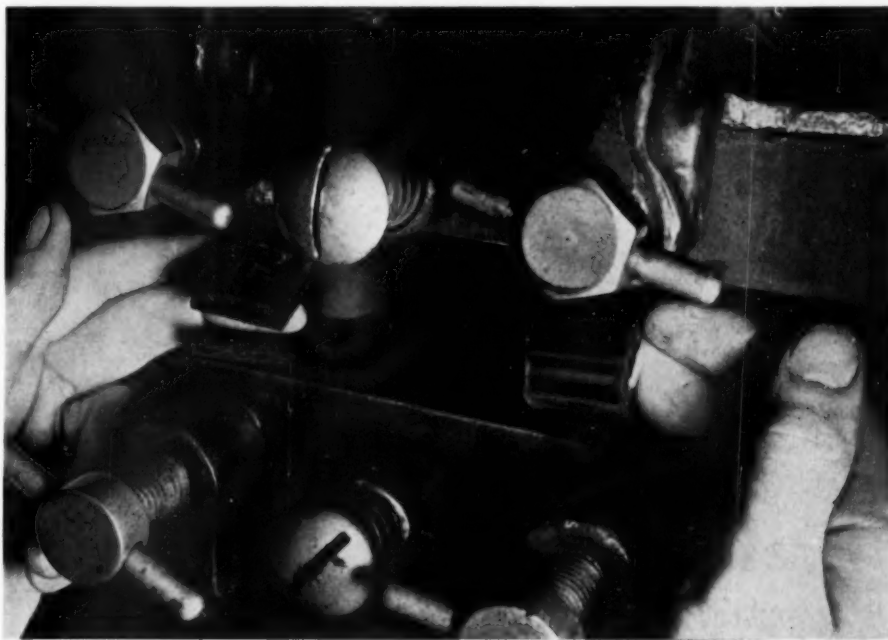
rubber-like properties. Polymers with no residual unsaturation may be made by uniting the simple olefins, or compounds, which are readily available as constituents of petroleum refinery gases. But these olefins because of their saturated character resist all efforts to vulcanize them with sulfur.

"Through long years of research by a large group of men, the Esso Laboratories have now developed a method of co-polymerizing olefins with small amounts of diolefins to give just the proper degree of unsaturation for vulcanization—but no more.

"Out of these efforts has come butyl rubber which after vulcanization is a product with substantially no residual chemical unsaturation. As a result, butyl rubber is characterized by a remarkable stability and durability which for many purposes make it superior to natural rubber and to other synthetics.

"By variations in the composition of the raw materials employed, it is possible to obtain products that differ considerably in their detailed properties, but the basic characteristic remains the same insofar as the limited unsaturation is concerned."

His researches, Dr. Frolich said, have made it possible to pick out definite qualities in which the butyl rubber should excel. These can be achieved, thus adapting it to specific purposes, such as tires,



### DURABLE

After 3,000,000 sharp bends or flexures, a rubber sample (left) has been broken, while the butyl rubber (right) is as good as new.



electrical insulation, hose, etc., which may make different demands. Future manufacturing plans, he explained, are dependent on the progress of tests now

being made and will also be governed by the defense needs of the U. S. Government.

*Science News Letter, September 21, 1940*

GENERAL SCIENCE

## Science, Philosophy, Religion Find Ground for Common Front

**Emphasize Need for Upholding Human Dignity of Individual As Means for Combating the Dictator Ideologies**

By WATSON DAVIS

**E**MPHATICALLY repudiating the primitive identification of the state and the Deity that the totalitarian states have reestablished, scientists, philosophers and religionists who met in a Conference on Science, Philosophy and Religion joined in a manifesto calling upon America to marshal her intellectual and spiritual forces to a united front in the face of the pseudo-religious philosophies of Hitler, Stalin and the Japanese Emperor. The conference was held at the Jewish Theological Seminary of America, New York, Sept. 9-11, under

the chairmanship of President Louis Finkelstein of the host institution.

The ancient doctrines of human dignity, formulated in terms of modern science and philosophy, the statement declares, may become a motivating power, energizing our people to defend their freedom with a passion equal to that brought by the totalitarians to its destruction.

Some 40 intellectual leaders signed the manifesto.

"The pseudo-religious philosophies of the totalitarian nations have proven formidable weapons in their hands," the manifesto explains. "Decreasing respect

for ethical and religious values among the democratic peoples has introduced intellectual confusion in their educational systems, in their literatures, and in organs of public opinion generally. Taking advantage of this confusion, the totalitarians have won considerable numbers of adherents even among the free peoples of the world. In consequence, the morale of the democracies has deteriorated and their power of resistance to totalitarian arms and diplomacy has diminished.

### Union Needed for Defense

"We dare not remain disunited or in conflict with one another, in a world where our opponents are closely united. Nor dare we rear our children as cynical recipients of the benefits of civilized society, rather than as responsible participants in its burdens. A cynical, divided, hyper-individualistic America will necessarily become a doomed America.

"No resort to totalitarianism is needed to overcome the intellectual confusion of our time. America was the first nation to apply the principle of federation to a land of continental dimensions. American genius should be able to apply the same principle to cooperation between groups of different religious, political, and educational views. Without for a moment considering the submergence of any discipline, scientific or philosophical, to any other, and without believing it possible or desirable that Western religions be reduced to a common denominator, our common background gives us a broad basis for a united, dynamic philosophy of American democratic life. This philosophy must take as its major premise the religious principle of the Fatherhood of God, and the worth and dignity of Man. It must uncompromisingly oppose any effort at deification of the state, or the suppression of individual liberty and sense of moral responsibility."

During the coming year the Conference on Science, Philosophy and Religion, called by 80 founding members, and attended by about 500 persons, will endeavor to obtain cooperation from all the leaders of science, philosophy and religion who agree with its fundamental principles for promoting the democratic way of life.

### Scientists Favor Naturalism

The conference made it evident that there is a dividing line drawn on the question of supernaturalism. (Turn to page 188)



#### CONFEREES

Dr. William E. Ritter, biologist and honorary president of Science Service, (left) is here shown chatting between sessions of the Conference on Science, Philosophy and Religion with Prof. Louis Finkelstein, president of the host institution, the Jewish Theological Seminary of America.

GENERAL SCIENCE

# Personal God Concept Causes Science-Religion Conflict

*The following statement on "Science and Religion" by Prof. Albert Einstein, the great relativist, was a written communication to the Conference on Science, Philosophy and Religion held at the Jewish Theological Seminary of America, New York.*

By PROF. ALBERT EINSTEIN

IT WOULD not be difficult to come to an agreement as to what we understand by science. Science is the century-old endeavor to bring together by means of systematic thought the perceptible phenomena of this world into as thoroughgoing an association as possible. To put it boldly, it is the attempt at the posterior reconstruction of existence by the process of conceptualization. But when asking myself what religion is, I cannot think of the answer so easily. And even after finding an answer which may satisfy me at this particular moment, I still remain convinced that I can never under any circumstances bring together, even to a slight extent, all those who have given this question serious consideration.

At first, then, instead of asking what religion is, I should prefer to ask what characterizes the aspirations of a person who gives me the impression of being religious: a person who is religiously enlightened appears to me to be one who has, to the best of his ability, liberated himself from the fetters of his selfish desires and is preoccupied with thoughts, feelings, and aspirations to which he clings because of their super-personal value.

## Force of Conviction

It seems to me that what is important is the force of this super-personal content and the depth of the conviction concerning its overpowering meaningfulness, regardless of whether any attempt is made to unite this content with a Divine Being, for otherwise it would not be possible to count Buddha and Spinoza as religious personalities.

Accordingly, a religious person is devout in the sense that he has no doubt of the significance and loftiness of those super-personal objects and goals which neither require nor are capable of rational foundation. They exist with the same necessity and matter-of-factness as he himself. In this sense religion is the

age-old endeavor of mankind to become clearly and completely conscious of these values and goals and constantly to strengthen and extend their effects.

If one conceives of religion and science according to these definitions then a conflict between them appears impossible. For science can only ascertain what is, but not what should be, and outside of its domain value judgments of all kinds remain necessary. Religion, on the other hand, deals only with evaluations of human thought and action; it cannot justifiably speak of facts and relationships between facts. According to this interpretation, the well-known conflicts between religion and science in the past must all be ascribed to a misapprehension of the situation which has been described.

## Literalness Makes Conflict

For example, a conflict arises when a religious community insists on the absolute truthfulness of all statements recorded in the Bible. This means an intervention on the part of religion into the sphere of science; this is where the struggle of the Church against the doctrines of Galileo and Darwin belongs. On the other hand, representatives of science have often made an attempt to arrive at fundamental judgments with respect to values and ends on the basis of scientific method, and in this way have set themselves in opposition to religion. These conflicts have all sprung from fatal errors.

Now, even though the realms of religion and science in themselves are clearly marked off from each other, nevertheless there exist between the two strong reciprocal relationships and dependencies. Though religion may be that which determines the goal, it has, nevertheless, learned from science, in the broadest sense, what means will contribute to the attainment of the goals it has set up.

But science can only be created by those who are thoroughly imbued with the aspiration towards truth and understanding. This source of feeling, however, springs from the sphere of religion. To this there also belongs the faith in the possibility that the regulations valid for the world of existence are rational, that is comprehensible to reason. I cannot conceive of a genuine scientist without that

profound faith. The situation may be expressed by an image: science without religion is lame, religion without science is blind.

Though I have asserted above, that in truth a legitimate conflict between religion and science cannot exist. I must nevertheless qualify this assertion once again on an essential point, with reference to the actual content of historical religions. This qualification has to do with the concept of God. During the youthful period of mankind's spiritual evolution, human fantasy created gods in man's own image, who, by the operations of their will were supposed to determine, or at any rate to influence, the phenomenal world. Man sought to alter the disposition of these gods in his own favor by means of magic and prayer. The idea of God in the religions taught at present is a sublimation of that old conception of the gods. Its anthropomorphic character is shown, for instance, by the fact that men appeal to the Divine Being in prayers and plead for the fulfillment of their wishes.

Nobody, certainly, will deny that the idea of the existence of an omnipotent, just and omnibenevolent personal God is able to accord man solace, help, and guidance; also, by virtue of its simplicity the concept is accessible to the most undeveloped mind. But, on the other hand, there are decisive weaknesses attached to this idea in itself, which have been painfully felt since the beginning of history. That is, if this Being is omnipotent, then every occurrence, including every human action, every human thought, and every human feeling and aspiration is also His work; how is it possible to think of holding men responsible for their deeds and thoughts before such an Almighty Being? In giving out punishment and rewards He would to a certain extent be passing judgment on Himself. How can this be combined with the goodness and righteousness ascribed to Him?

## Personal God Disputed

The main source of the present-day conflicts between the spheres of religion and of science lies in this concept of a personal God. It is the aim of science to establish general rules which determine the reciprocal connection of objects and events in time and space. For these rules, or laws of nature, absolutely general validity is required—not proven. It is mainly a program, and faith in the possibility of its accomplishment in principle is only founded on partial successes. But hardly anyone could be found who would deny these partial successes and

ascribe them to human self-deception.

The fact that on the basis of such laws we are able to predict the temporal behavior of phenomena in certain domains with great precision and certainty, is deeply embedded in the consciousness of the modern man, even though he may have grasped very little of the contents of those laws. He need only consider that planetary courses within the solar system may be calculated in advance with great exactitude on the basis of a limited number of simple laws. In a similar way, though not with the same precision, it is possible to calculate in advance the mode of operation of an electric motor, a transmission system, or of a wireless apparatus, even when dealing with a novel development.

### Complexity Brings Breakdown

To be sure, when the number of factors coming into play in a phenomenological complex is too large, scientific method in most cases fails us. One need only think of the weather, in which case prediction even for a few days ahead is impossible. Nevertheless no one doubts that we are confronted with a causal connection whose causal components are in the main known to us. Occurrences in this domain are beyond the reach of exact prediction because of the variety of factors in operation, not because of any lack of order in nature.

We have penetrated far less deeply into the regularities obtaining within the realm of living things, but deeply enough nevertheless to sense at least the rule of fixed necessity. One need only think of the systematic order in heredity, and in the effect of poisons, as for instance alcohol on the behavior of organic beings. What is still lacking here is a grasp of connections of profound generality, but not a knowledge or order in itself.

The more a man is imbued with the ordered regularity of all events, the firmer becomes his conviction that there is no room left by the side of this ordered regularity for causes of a different nature. For him neither the rule of human nor the rule of Divine Will exists as an independent cause of natural events. To be sure, the doctrine of a personal God interfering with natural events could never be *refuted*, in the real sense, by science, for this doctrine can always take refuge in those domains in which scientific knowledge has not yet been able to set foot.

But I am persuaded that such behavior on the part of the representatives of religion would not only be unworthy but also fatal. For a doctrine which is able

to maintain itself not in clear light but only in the dark, will of necessity lose its effect on mankind, with incalculable harm to human progress.

In their struggle for the ethical good, teachers of religion must have the stature to give up the doctrine of a personal God, that is, give up that source of fear and hope which in the past placed such vast power in the hands of priests. In their labors they will have to avail themselves of those forces which are capable of cultivating the Good, the True, and the Beautiful in humanity itself. This is, to be sure, a more difficult but an incomparably more worthy task. (This thought is convincingly presented in Herbert Samuel's book, "Belief and Action.") After religious teachers accomplish the refining process indicated, they will surely recognize with joy that true religion has been ennobled and made more profound by scientific knowledge.

If it is one of the goals of religion to liberate mankind as far as possible from the bondage of egocentric cravings, desires, and fears, scientific reasoning can aid religion in yet another sense. Although it is true that it is the goal of science to discover rules which permit the association and foretelling of facts, this is not its only aim. It also seeks to reduce the connections discovered to the smallest possible number of mutually independent conceptual elements. It is in this striv-

ing after the rational unification of the manifold that it encounters its greatest successes, even though it is precisely this attempt which causes it to run the greatest risk of falling a prey to illusions.

But whoever has undergone the intense experience of successful advances made in this domain, is moved by profound reverence for the rationality made manifest in existence. By way of the understanding he achieves a far-reaching emancipation from the shackles of personal hopes and desires, and thereby attains that humble attitude of mind towards the grandeur of reason incarnate in existence, which, in its profoundest depths, is inaccessible to man. This attitude, however, appears to me to be religious, in the highest sense of the word. And so it seems to me that science not only purifies the religious impulse of the dross of its anthromorphism, but also contributes to a religious spiritualization of our understanding of life.

The further the spiritual evolution of mankind advances, the more certain it seems to me that the path to genuine religiosity does not lie through the fear of life, and the fear of death, and blind faith, but through striving after rational knowledge. In this sense I believe that the priest must become a teacher if he wishes to do justice to his lofty educational mission.

*Science News Letter, September 21, 1940*



### TRI-PARTITE PLATFORM

*Dr. William F. Albright, Johns Hopkins archaeologist, presiding at the natural sciences session of the Conference on Science, Philosophy and Religion. The public meetings of the conference were held in a large tent in the quadrangle of the Jewish Theological Seminary of America because no hall of the buildings was sufficiently large.*



## MEDICINE

# Permanent Recovery From Diabetes Through Insulin

Chief Value of Experiment With Cats Is in Showing Importance of Early and Thorough Treatment

**A**PPARENTLY permanent recovery from diabetes—what the layman would term a cure—has been achieved by insulin treatment of cats, Dr. F. D. W. Lukens and Dr. F. C. Dohan, of the George S. Cox Medical Research Institute, University of Pennsylvania report. (*Science*, Sept. 6)

For human diabetic patients, the chief value of the research at present is that it shows that diabetes should be treated as early and as thoroughly as possible, Dr. Dohan explained.

Generally, diabetic patients must go on taking insulin every day in order to stay well. The diabetic cats, however, stayed well and gained weight for three months following the stopping of all insulin. One important factor that may have accounted for the permanent recoveries of the cats is that the insulin treatment was started very soon after the diabetes started.

There is as yet no evidence, Dr. Dohan said that human patients will recover from diabetes permanently after insulin

treatment, but it is possible and even probable that the disease can be kept from progressing or getting worse if the patient gets good treatment early.

The permanence of the recovery of the cats was shown not only by lack of symptoms of diabetes but also by the normal condition of the insulin-producing glands of the cats when examined at the end of the three-month period without insulin. Before treatment with insulin, these glands in the pancreas showed marked degeneration of a kind called hydropic. They were swollen with water. But during the insulin treatment they recovered sufficiently to take over the job of once more producing enough insulin for the cat's needs.

When the insulin-producing glands degenerate in a different way, drying and disappearing instead of swelling with water, recovery cannot be expected to take place. Perhaps, although this is not yet proved, the watery degeneration changes to the other type when the diabetes is not treated early.

*Science News Letter, September 21, 1940*

## PHYSIOLOGY

# New Enzyme in Blood May Aid Against Addiction

**T**HE SCIENTIFIC fight against drug addiction has been aided by the discovery of a hitherto unknown chemical agent in the blood.

Discovery of the chemical agent, an enzyme or ferment called an esterase, was made by Dr. C. I. Wright, of the National Institute of Health (*Science*, Sept. 13).

This esterase chemically blitzkriegs heroin and certain other morphine compounds, breaking them down into the morphine and other chemicals from which they were made.

Scientists have been trying, in their attack on drug addiction, to build up a non-habit-forming chemical which could be used as a substitute for morphine and

other habit-forming narcotic drugs. Dr. Wright's discovery of the new enzyme and also of the reason for heroin being more powerful than morphine are expected to aid this attack on drug addiction.

Some animals apparently have more of the new enzyme, or a different one, in their blood than others, because blood serum from some of the animals affected heroin and other morphine compounds differently.

Human blood serum has less ability to blitzkrieg heroin into morphine than rabbit blood. Whether the blood of a morphine or heroin addict differs in this respect from the blood of non-addicts has not yet been determined.

Heroin is a more powerful drug than morphine. The difference in potency, Dr. Wright believes from his studies, is due to heroin being more soluble than morphine and thus getting into the blood and perhaps other tissues more quickly and in higher concentration than morphine does, although when it gets into the blood, it is changed into morphine and acts as morphine does.

*Science News Letter, September 21, 1940*

## ETHNOLOGY

# Classic Book on Folkways Exposes Nazi Fallacies

**W**HILE Europe's dictators strive to impose new patterns of living on the civilized world, the birth centennial of a great American teacher who analyzed human customs to the core is being memorialized.

If he were alive, Prof. William Graham Sumner would be 100 years old on Oct. 30. But his famous book, *Folkways*, which is being reissued in a centennial edition, takes stock of Nazi ideas almost as though it were written in 1940, instead of 1906.

The German warning that American gold will turn valueless, and that the world will have to trade by barter, is a long step backward toward the Stone Age. So Prof. Sumner's explanations of how even primitives evolved money make clear. Money he casually refers to as "another primitive device." Even before the idea of money was evolved, men solved problems of property and trade by evolving money itself.

As for the Nazi doctrines of Aryan superiority, the science of society had a name for it back in 1906.

"Ethnocentrism," wrote Prof. Sumner, "is the technical name for this view of things in which one's own group is the center of everything and all others are scaled and rated with reference to it."

There has been plenty of ethnocentrism in the world. Carib Indians declared, "We alone are the people." Greenland Eskimos thought they were giving a European the highest praise by saying he was as good as a Greenlandic.

Prof. Sumner in 1909 wrote: "The Germans have become nervous; they struggle feverishly for success and pre-eminence. . . . Germany now has great ambition for the first place among nations."

*Science News Letter, September 21, 1940*

White cotton hose, made according to designs worked out by government textile experts, are being tried out in service by hospital nurses.

## PSYCHOLOGY

**Slogans Unattractive, When Accompanied by Bad Odors**

**N**EWs for politicians: The odors in party meeting places may be as important as the free lunch for winning or losing voters' approval.

A putrid odor (literally) associated with slogans such as "soak the rich," or "keep America out of war," makes them much less appealing, Dr. Gregory Razran, of Queens College, found in experiments with political liberal students. Free lunch makes such slogans more attractive.

Unfortunately for politicians, however, judgment of the literary value of the slogans is more easily influenced than personal approval.

For some slogans, approval is so imbedded that change seems to be impossible. One such unchangeable slogan is "A public office is a public trust." This is practically universally approved.

Dr. Razran reported his findings to the American Psychological Association at Pennsylvania State College.

*Science News Letter, September 21, 1940*

## MEDICINE

**New Sulfa Drug Used In Treatment of Dysentery**

**A** NEW sulfa drug which is giving "fairly promising" results in treatment of bacillary dysentery and which is expected to prove useful in typhoid fever is announced by Prof. E. K. Marshall, Jr., and Dr. A. Calvin Gratton, Dr. H. J. White and Dr. J. T. Litchfield, Jr., of the Johns Hopkins Hospital.

The new drug, relative of sulfanilamide, is sulfanilylguanidine. Details of its preparation and tests on animals appear in the *Bulletin of the Johns Hopkins Hospital*. (September)

Patients are now being treated with it, but because there has been less bacillary dysentery in Baltimore this summer than ever before, there have been too few patients to be sure of the value of the drug, Prof. Marshall stated. All that can be said of the new drug now is that it is "fairly promising."

The new drug was developed during efforts to produce one as effective as sulfapyridine against pneumonia but less toxic. When sulfanilylguanidine was made during this research, it turned out to be poorly absorbed from the intestinal tract. This suggested its possible usefulness against infections of this part of the digestive system, especially dysentery and

typhoid fever. The poor absorption of the drug from the intestinal tract should give it a longer time to exert its destructive action on germs there.

The drug, it is believed, will be less toxic than sulfapyridine or sulfathiazole, and has shown ability to destroy intestinal tract germs both in the test tube and in mice.

*Science News Letter, September 21, 1940*

## PSYCHOLOGY—AERONAUTICS

**Grip on Stick Reveals Tension of Student Pilots**

**A** PNEUMATIC grip substituted for the control stick on airplanes of student pilots is revealing just how tense they are while they are maneuvering in the air, Dr. Alexander C. Williams, Jr., of the University of Maryland, reported to the American Psychological Association meeting at Pennsylvania State College.

"Too tense," is often the explanation made by flying instructors of the poor flying of students. Now for the first time an accurate measurement of tenseness is possible. The new instrument is attached to a "flight analyzer" which simultaneously records air speed, altitude, and climb acceleration of the plane.

Take-offs and landings were found to account for 90% of the tension in the case of the ten students already tested with the new instrument. The best students have the least amount of excessive tension during their landings.

Dr. Williams' experiment is part of the research program now being rushed under joint auspices of the National Research Council and the Civil Aeronautics Board.

*Science News Letter, September 21, 1940*

## ENGINEERING

**New Sound System Helps In Outdoor Concerts**

**T**HE SOUND system recently installed for outdoor concerts in a large city is declared to show that music can be reproduced and amplified while preserving the wide variety of tonal and emotional color which is so often lost in outdoor concerts to all except those seated immediately in front of the orchestra. (Western Electric Company).

A single microphone picks up the sound of the entire orchestra as the ear would hear it, and naturalness is further assured by a remote control panel at the hands of an operator in the audience.

*Science News Letter, September 21, 1940*

**IN SCIENCE**

## PSYCHOLOGY

**Spring Babies Brighter Because of Selection**

**B**ABIES born in the spring really are a little brighter than other children, Dr. Florence L. Goodenough, of the University of Minnesota, told the American Psychological Association.

But the explanation, she believes, lies not in the weather but in the planning of births. Studying 3,275 children about whom she had the necessary information, Dr. Goodenough found that children whose parents belong to the professional and "white collar" occupations have higher IQ's than children of the laboring classes. The white collar workers and professional people have a better acquaintance with birth control methods. And, to clinch matters, the children of these upper occupational classes are more commonly born in the springtime.

A questionnaire distributed to leading baby doctors and to mothers in a superior residential district revealed that the spring months are considered by these persons as best for the birth of babies.

*Science News Letter, September 21, 1940*

## ASTRONOMY

**Science Classic Is Finally Translated**

**N**EARLY 400 years after its original publication, one of the most important books in science history has been translated into English for the first time. This is "On the Revolutions of the Celestial Spheres," written (in Latin) by the Polish astronomer, Nicholas Copernicus, and published just before his death in 1543. It led to recognition that the earth revolves around the sun.

In connection with the new program of St. John's College, Annapolis, which emphasizes study of classics of science as well as of literature, the translation has been made by a tutor, Charles Glenn Wallis. Issued provisionally in mimeographed form, Mr. Wallis is now revising it. Publication in a two-volume set, including also translations of two other scientific landmarks, Ptolemy's "Almagest" and parts of Kepler's "Epitome of Copernican Astronomy," is scheduled for Jan., 1942.

*Science News Letter, September 21, 1940*



# CE FIELDS

## VOLCANOLOGY

## Ill-Smelling Gas May Warn Of Volcanic Eruptions

**V**OLCANOES may give warning of coming eruptions by emitting ill-smelling hydrogen sulfide gas, Prof. John H. Payne and Dr. Stanley S. Ballard, of the University of Hawaii and the Hawaiian Volcano Observatory, suggest. (*Science*, Sept. 6)

Prof. Payne and Dr. Ballard kept close track of the various gases emitted by the solfataras or gas vents on Kilauea, Hawaii's biggest crater. These were found to fluctuate in their proportions without any apparent relation to the activities of the volcanoes themselves, except that on two occasions the solfataras gave off the rotten-egg smell of hydrogen sulfide shortly before eruptions of nearby Mauna Loa, which is known to be connected with Kilauea.

They state: "The appearance of hydrogen sulfide in the Kilauea solfataric gases just prior to Mauna Loa activity may have been a premonitory sign. If so, this appears to afford an exceedingly valuable method of forecasting volcanic outbreaks. Furthermore, this incidence of hydrogen sulfide suggests a close relationship between solfataric activity and primary volcanism."

*Science News Letter, September 21, 1940*

## ARCHAEOLOGY

## Pocahontas' Tribe May Have Sacrificed Human Beings

**T**HE MYSTERY of charred human bones, which archaeologists are unearthing in Virginia, may point to unsuspected barbaric human sacrifices for weather control by the famous tribe of Pocahontas and Chief Powhatan.

Likelihood that Captain John Smith could have been serving as a sacrifice for rain when saved from violent death by Pocahontas is discounted, however. Even a Pocahontas would hardly have dared to interfere with a religious rite.

That Indians along the Potomac made a fire circle and offered up two or three children to a terrible rain god, 'Quio-quascacke,' each year was related by one of Virginia's oldest historians, Henry

Spelman, contemporary of Captain John Smith. Archaeologists, heretofore finding no evidence for such sacrifices, have disbelieved the tale.

In his latest finds, just made along the York River, Virginia, Dr. T. D. Stewart of the Smithsonian Institution has brought to light, from a burial pit, bundles of bones not burned, and accompanied by some burned bones.

Offering two possible solutions of the mystery, Dr. Stewart says that the tribe may have tried to control the weather by offering human life, as Spelman, in picturesque detail, described. Or else, when the Indians collected human bones for "secondary burial" in grave pits, the ceremonies may have included burning one or more skeletons.

Possibility that some bones became accidentally burned is also seen. In an old picture, John White portrayed the custom of Virginia Indians of exposing the dead on high platforms for a time. Beneath the platform burned a ceremonial fire.

*Science News Letter, September 21, 1940*

## INVENTION

## Now You Can Get Cubes Without Opening the Door

**I**CE CUBES may be obtained from an electric refrigerator without opening the door, if it is provided with a new invention. (Patent 2,212,405, Howard J. Rose, New Rochelle, N. Y. and Benson Eschenbach, Chappaqua, N. Y.) By operating a handle on the outside of the box a predetermined number of cubes is delivered through a discharge chute. An electric heater melts the ice in each individual tray sufficiently to release it. After being emptied, it is automatically filled with water, to be frozen into another cube.

*Science News Letter, September 21, 1940*

## INVENTION

## Automatic Bandit Returns Police Fire

**A**N AUTOMATIC bandit, a mechanical target which returns the fire by shooting a revolver at the person engaged in practice, is the newest device to train police in shooting. When the target, which is made of heavy steel, is hit by a bullet, a bell rings, it makes a quarter turn, and the revolver, fortunately loaded with blanks, is fired. Thus the effect is that of running fire between an officer and a lawbreaker.

*Science News Letter, September 21, 1940*

## PSYCHOLOGY—AERONAUTICS

## Strychnine Drops May Aid Vision at High Altitudes

**S**TRATOSPHERE flyers may have drops put in their eyes to improve their vision at high altitudes, if research reported to the American Psychological Association by Drs. Clifford P. Seitz, of the University of Alabama, and Charles M. Rosenthal, of the Long Island College of Medicine, is applied in aviation.

Lack of oxygen at high altitudes causes a widened "blind area" in the field of vision. This would make it difficult for the pilot suffering from oxygen deprivation to watch the multitude of instruments and other objects he must constantly keep in sight.

This situation can be duplicated in the laboratory in an "altitude chamber." Drs. Seitz and Rosenthal put their subjects at a simulated altitude of 17,500 feet and watched the characteristic broadening of the blind area. Then they put three drops of strychnine in one eye and plain water in the other. The blind area then became smaller for the eye that had the strychnine drops.

*Science News Letter, September 21, 1940*

## ENGINEERING

## Crop Protector Depends On Infra-Red Radiation

**S**UNLAMPS are used for crops nowadays. A new infra-red anti-freezing system is now available (Smoot-Holman Co., Inglewood, Calif.). It consists of a series of units suspended on wires above the plants, and controlled from a central panel. The air temperature is not increased, but the infra-red rays maintain the flow of sap in leaves and branches.

*Science News Letter, September 21, 1940*

## PSYCHOLOGY

## Innate Musical Ability Shows No Sex Differences

**N**O INBORN difference in musical ability exists between the sexes, Dr. G. M. Gilbert, of Connecticut College for Women and the College of the City of New York, told the American Psychological Association.

Girls appear to be more musical than boys, but that is because the girls are given the training. When tests were given both boys and girls and when the effects of training had been taken into account, it was revealed that the girls are not so superior after all.

*Science News Letter, September 21, 1940*

## PSYCHOLOGY

# Mind is Just a Machine Psychologist Concludes

**Not So Simple as Engine in Your Automobile  
But Nevertheless Mechanical, Embryo Study Reveals**

**T**HE MIND is a machine. This is what Dr. Leonard Carmichael, president of Tufts College, told members of the American Psychological Association in his address as their president.

Your mind is not so simple a machine as the one that runs your automobile or any other that you are used to working with. What the mind can do changes with its growth and development.

But from the time, long before normal birth, when a puff of air against the nose will make the tiny unborn creature try to brush it away, the mental machine is at work. Behavior even then is just as purposeful as any behavior not involving language ever is throughout life.

The mental machine, after birth and during the lifetime, becomes more complex. What it can do is also more complex. But it does not become in any sense non-mechanical, Dr. Carmichael said. This is still true, he declared, when the individual acts in a manner that any observer would call "purposive" or when his behavior is changed by his learning.

Dr. Carmichael's conclusion, which seems a blow to one form of "free-will" theory which holds that man is in every

way "the captain of his soul," is based on his study of mental development of animals at very early ages before birth. He did point out, however, that other approaches to the study of man's mind might well be phrased in non-mechanistic terms.

With growth, these tiny bodies are able to adapt themselves more and more effectively to changes in their environment. But this growth in ability to behave appropriately under changing circumstances is as natural and independent of learning as is the lengthening of the hair.

The zero point of mind, he said, may be placed at the point when the living organism first responds to such outside circumstances.

That is when mental life begins. It is at a different age for different animals. In the human baby, the first response is probably a movement of an arm or leg, not the whole body.

The first sense to develop in the unborn is the skin sense of pressure. At first there are mere twitches in response. Before birth the response is coordinated and adaptive.

Latest senses to develop are vision and hearing. The cat, for example, cannot see until a number of days after birth, but the guinea pig eye has real acuity-vision before birth.

*Science News Letter, September 21, 1940*

## DENTISTRY

## Army Expects Many Draftees Will Require New Teeth

**F**ALSE teeth appeared as a national defense preparedness item in a report to the American Dental Association meeting in Cleveland.

Army officials expect that a large percentage of the men who would be inducted into the Army under a compulsory draft law will need "extensive dental replacements," Brig. Gen. Leigh C. Fairbank, U. S. Army Dental Corps, told the meeting.

"The men of military age today," he said, "will certainly show the lack of dental care during the depression years. This condition must not be permitted to contribute a disqualifying factor to the extent which conditions indicate."

The Army is ready to meet the need of draftees for new teeth and other dental treatment, the entire plan for dental service in time of mobilization having been revised "to meet conditions which we are certain will exist in every Army camp."

*Science News Letter, September 21, 1940*

## Gum Disease Takes Half

**H**ALF of the "world's lost teeth are lost because disease of the gums makes their extraction necessary," Dr. Olin Kirkland, Montgomery, Ala., charged. Dental decay or caries, he said, is responsible for only one-half of the cases of tooth extraction, instead of all of them as is commonly supposed.

*Science News Letter, September 21, 1940*

## PHYSICS

## One-Sided Gauge Measures Thickness of Enamel

**A**N ELECTRIC gauge has recently been developed which will measure the thickness of porcelain enamel on surfaces and indicate a difference of as little as 1/10,000 of an inch. It tells the thickness simply by applying it to one side of the piece, and no computations, considering the thickness of the metal base, are required. (General Electric Company.)

*Science News Letter, September 21, 1940*



**FOUR PRESIDENTS**

Meeting together recently at Pennsylvania State College, were four national psychological associations. Here are shown their four presiding officers: Dr. Leonard Carmichael, Tufts College, of the American Psychological Association; Dr. Karl J. Holzinger, University of Chicago, of the Psychometric Society; Dr. Edward C. Tolman, University of California, Society for the Psychological Study of Social Issues and Dr. Horace B. English, Ohio State University, American Association for Applied Psychology.

## CHEMISTRY

# Heavy Hydrogen Discoverer Isolates Heavy Sulfur

## New Method for Studying Function of Sulfur in Body Available With Production of New Isotope

**N**EW methods of analysis and new means of studying the function in the human body of sulfur, as essential for life as iron, phosphorus or iodine, will be possible with heavy sulfur, according to chemists attending the 100th meeting of the American Chemical Society in Detroit.

At a session of the Society on Tuesday afternoon, the production of heavy sulfur for the first time was described by Drs. David W. Stewart and Karl Cohen, of Columbia University. The researches were conducted under the direction of Dr. Harold C. Urey, head of the chemistry department, who discovered heavy hydrogen in 1934, for which he received the Nobel prize. Later he prepared heavy forms of oxygen and other elements.

Most elements consist of a mixture of several isotopes. These are made of atoms of different weights, though having similar chemical properties. Ordinary sulfur contains four; 95% being of weight 32; 4% of weight 34, which is the isotope now isolated; 1% of weight 33 and one part in 6,000 of weight 36.

Separation of the isotope, at a cost of

\$1,500 per ounce as compared with a cent an ounce for common sulfur, was achieved with Dr. Urey's "counter-current scrubbing method," previously used to separate isotopes of carbon and nitrogen.

A gas, sulfur dioxide, was passed upwards and a liquid, sodium hydrogen sulfite, was allowed to flow downwards through 150 feet of bent glass tubing. Sulfur 34 is more soluble in the liquid than the other varieties. Therefore, at the end of the process the liquid in the bottom contained about a quarter of the heavy isotope.

Researches are now being made by Dr. Vincent du Vigneaud, professor of biochemistry in the Cornell University School of Medicine, using heavy sulfur to determine the role of the element in bodily chemistry. Using the isotope, sulfur atoms can be tagged at the start of an experiment, and identified at intermediate stages, and at the end of the reaction. This method promises also to be of use in tracing sulfur in complicated organic reactions which are not concerned with living organisms.

*Science News Letter, September 21, 1940*

## CHEMISTRY

# Coal and Oil Are Synthesized From Plant Carbohydrates

**F**ROM farms instead of mines and oil wells will come the coal and gasoline of the future, Dr. Ernst Berl, research professor at Pittsburgh's Carnegie Institute of Technology, predicted at the 100th meeting of the American Chemical Society in Detroit.

Already, in his laboratory, crude oil, bituminous coals, asphalts and coke have been produced from materials like corn, wood, seaweed, leaves and molasses. These are rich in compounds known as carbohydrates, of which starch and sugar are examples. The resulting coals, asphalts and oils, he said, have exactly the same properties as the natural products.

So far anthracite coal has not been made, but this will be attempted in the near future.

Great advantage of the new process is that a fuel source is provided that can constantly be renewed. Nature's supplies of coal and oil are fixed. When exhausted they will not be replaced until untold ages have passed. Dr. Berl stated that he could make coal or oil from carbohydrates in from one to two hours.

The method, he said, is "rather simple." It involves heating the carbohydrate materials under pressure with limestone. At present, it cannot compete in price with crude oil obtained from the

ground, but, he declared, it is cheaper than making gasoline from coal by the hydrogenation process, which requires expensive high-pressure apparatus.

"In the United States at present there is no industrial interest in producing crude oil from cotton, wood, leaves, grass or molasses," said Dr. Berl, "but the time is not very far away when most of the easy-to-produce oil will be exhausted. Then, from all kinds of carbohydrate-containing raw materials, which the farmer can produce to a large extent, important amounts of asphalts and crude oils can be produced at prices which can certainly compete with other methods of the future. The transformation of carbohydrates furnishes an excellent liquid fuel which, thanks to the rather large amount of aromatic hydrocarbons, shows a rather high anti-knock value."

Estimates have been made that the United States possesses about 60% of the world's coal reserves and more than 50% of its oil reserves.

"We have coal for perhaps 3,000 years and probably oil also for at least one generation," he continued. "In the future, when the low-priced crude oil will have been exhausted, methods like the distillation of oil shale and the hydrogenation of coal and carbon monoxide will be carried out. To these methods the production of different classes of substances with asphalt and crude oil properties from carbohydrates can be added. Especially in warmer climates carbohydrates are produced much in excess of what mankind would need for foodstuffs, textiles, explosives and lacquers."

Dr. Berl held no hope for a farmer of the future making his own gasoline, for, he said, the process needs high-pressure apparatus. He would have to send his material to a central plant, as he does now with beets for beet sugar.

An important theoretical point about Dr. Berl's studies is that old ideas of the formation of coal and oil in nature are disproved. It has been held that lignin, the woody skeleton of trees, was the main source of all solid fuels. Also, it has been suggested, natural oils were formed from dead fish. Dr. Berl says that the work in his laboratory has established that true bituminous coals are produced in nature from the plant carbohydrates, and not from the lignin, and also that asphalts are the parent material of crude oil.

*Science News Letter, September 21, 1940*

It is reported that flowers are being replaced with *potato plants* in public gardens of Oslo, Norway.



## From Page 180

The majority of the scientists are on the naturalistic side of the line. For them God is a non-personal deity, such as Prof. Albert Einstein favors in his paper (See page 181). What others call God is to them The Great Unknown, still unexplained by sensory research.

The majority of the philosophers and the theologians hold that there is a realm beyond nature, the supernatural, the property of metaphysics and religion. To the theologians of orthodox faiths there is a personal God, to be prayed to. The philosophers, or rather the metaphysicians, hold, in typical cases, that what they call truths of philosophy are "superior" to the truths of science of sensory experimental derivation which they consider "inferior" of necessity.

This is no new difference. It is as old as the differences between Aristotle and Plato.

This difference has implications in the present world situation, although the authoritarian Church may be aligned with the scientists in opposing the Nazi regime that has set up another religion and flouted or suppressed science.

## Scientists Open-Minded

Philosophers and theologians who claim the ultimate truth as their prerogative have difficulty in understanding and appreciating the willingness of scientists to change their minds in the face of new and changing knowledge.

Cognizant of these time-honored differ-

ences, focused anew, the speakers at the natural sciences session of the Conference on Science, Philosophy and Religion drew up a statement setting forth their understanding of science's relations to human reality and to democracy. This statement was adhered to by Dr. William E. Ritter of the University of California, Dr. Philipp Frank of Harvard, Dr. C. P. Haskins of Union College, Massachusetts Institute of Technology and Haskins Laboratories, Dr. Harold D. Lasswell of the Washington School of Psychiatry and Dr. William F. Albright of the Johns Hopkins University. The statement follows:

"The speakers in the field of natural science agree that the rational empiricism through which current science has achieved its present status is prerequisite to the future development of natural science, so far as we know. By rational empiricism they mean the method of reasoning based entirely on data which are perceived by the senses and the consequent reasoning which leads to conclusions verifiable by the senses.

"The speakers do not agree about the limitations of the method of rational empiricism. Some hold that it may be extended to cover all human reality; others that it may not be so extended.

"The ideals of scientific research coincide more closely with those of a democracy than those of any other form of society. By the proper application of scientific method, science can provide knowledge of great value for the protection and realization of democracy."

## Makes Democracy Work

Science was hailed as a means of making democracy work in four addresses by leading scientists.

To religion and philosophy, science indicated its willingness to lend its successful method and attitude in order that some of the most pressing problems of the world may be solved.

A new science of democracy that will utilize scientific methods to solve the many social problems that result from technical changes was proposed by Dr. Harold D. Lasswell of the Washington School of Psychiatry.

Religion was defined by Dr. William E. Ritter, veteran University of California biologist and honorary president of Science Service, as a sensory-ideational response to nature when nature is accepted in its seemingly infinite wholeness as constituted of its seemingly infinite number and variety of parts.

The scientific method of thought was recommended by Prof. Philipp Frank of

Harvard as a defense against totalitarianism because there is something in the thought of the scientist that makes him capable of particular resistance against regimented thinking.

Training in scientific work and thought for all American youth to give them a common and fundamentally democratic viewpoint was suggested by Dr. C. P. Haskins, of Union College, the Massachusetts Institute of Technology and the Haskins Laboratories, as a means of providing the beneficial elements in regimented military training shorn of dire implications of such training under the dictatorships.

"Students of physics and mathematics are least susceptible to the propaganda of the dictators, while the most uncritical adherents of totalitarianism are among the students of the engineering sciences," Dr. Frank told the Conference. "The engineer and the physicist are acquainted with the same facts, but the technical man always must consider the immediate application of his knowledge. His desire to maintain the economic structure which is favorable to technical activity makes him peculiarly susceptible to any ideology which seems to maintain that structure."

One of the chief characteristics of the scientific attitude is its refusal to be taken in by mere symbols, Dr. Frank explained. The general propositions may sound ever so beautiful and may be expressed in mathematical formulae, but for science they are only to be judged by the results of their use. If a principle brings suffering to humanity then, Dr. Frank contended, it must be a false principle and its falsity can be recognized through this suffering. Scientific training is a protection against following principles merely because they sound important and right.

Dr. Haskins told the Conference that

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**Coming-** THINGS units on Taste, Plastics, Meteorites, Heredity, Odors, Archaeology, to name a few of the units on which the Staff of Science Service is now working.

### Message to Schools

The description of each unit of THINGS will be on bristol board, with a museum-style legend for use in a laboratory display cabinet if desired. The legend card will also contain on its lower portion, a clear, brief explanation of the contents of the unit.

FOR YEARS, we of the staff of Science Service, the non-profit institution for the dissemination of scientific knowledge, have been asked questions like these:

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In the past we had no way to meet these requests, but there have been so many of them that we have *now worked out a way*.

A new science group is being organized to receive THINGS of science. The membership of this group is by necessity limited during 1940 to 1,000 and restricted to the United States. To each member of this new group we will each month dispatch a *unit of scientific material*, unusual, intriguing, surprising. With each unit we will supply a brief, clear explanation of its contents.

Since this is a non-profit organization, THINGS will not attempt to make money, so the membership charge has been set at \$2. Every member will get the full measure of interest and curiosity-satisfying knowledge from his monthly unit of THINGS.

The membership period will reach from November, 1940 through May, 1941, and will entitle each member to *seven* monthly units of THINGS.

You are invited to become a member. We recommend that you send us the following application form *immediately* because when a total of 1,000 friends of science have joined, the roster will have to be closed.

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scientific philosophy dictates a method of thinking which is definite and essentially alike among large groups of highly intellectual individuals, and it proposes a rigidity of discipline and offers a set of tangible standards of achievement which greatly reduce the natural variability in methods of work of good minds. The subject-matter of the thought may be various, but it is important to observe that this makes little difference.

"This quality of scientific thought may well show the path to both religion and philosophy," Dr. Haskins said. "Religion, like science, is primarily an attitude and a method, but of feeling, rather than thought. Philosophy is a method for the erection of mental structures from given mental timber. The tasks of both in achieving unity are less definable, more sweeping, and more difficult than those of science, which may well serve as object-lesson. For it is much more difficult to unify feeling than thought on the one hand, and on the other, the structures built by philosophy must vary tremendously with the nature of the timber available, which philosophy offers no way of standardizing. Science, to the contrary, deals with definable thoughts on the one hand, and on the other, can check its basic building materials against a physical world which offers constant if arbitrary standards."

### Naturalness and Unity

Dr. Ritter made the point that "man is a speaking, esthetic, religious, thinking, political, economic, moral and idealizing animal more than any of the lower animals" and recalled that Darwin's great work of developing the theory of evolution made clear the naturalness and unity of the living world.

Discussing the relation of science and religion, Dr. Ritter explained that Spinoza's identification of nature with God rules out exactly the aspect of nature with which Darwin produced his theory

of evolution. Dr. Ritter proposed a combination of Spinoza's doctrine and the whole Darwinian conception. This would leave no gap between nature of modern science and the vague conceptions of supernaturalistic existence that all ages and races of mankind have been aiming at under almost countless names.

The new science of democracy proposed by Dr. Lasswell would be concerned, for example, with the waste of man power in the democracies. There is the problem of transferring old resources, material and human, with a minimum of waste and of offense to human dignity. The social and economic status that is now referred to by the expression "the unemployed" should be abolished, with its implication of social uselessness. Man needs more than job security, Dr. Lasswell said. He needs security on a respected job.

"A science of democracy could provide the experience necessary in a world crisis to integrate the need of strength

in directing modern technical warfare, with the need of preserving democratic vitality," Dr. Lasswell continued. "Wise policy is guided by experience, and a science of democracy can provide for the proper application of the fruits of experience, since the full relevance of experience can be distilled when it is patiently observed, recorded, and examined."

"A science of democracy would not inhibit the total growth of science, but would be part of the total enterprise of science, concerned with the totality of human relations, with special reference to the processes that prejudice the attainment, and the perpetuation, of a democratic society. It would be devoted to the timing of knowledge, to the timely application of the available methods and findings of science to the end of realizing democracy in life. Upon a science of democracy depends the fullest realization of both democracy and science."

*Science News Letter, September 21, 1940*

#### HERPETOLOGY

## Spitting Cobras' Fangs Specialized for Jets

### Serpents in Zoo, Provoked to Eject Venom, Projected It So Forcibly It Audibly Struck Glass Five Feet Off

**W**EAPONS useful in either peace or war are the possession of three species of cobra, Charles M. Bogert of the American Museum of Natural History stated in a paper presented before the meeting of the American Society of Ichthyologists and Herpetologists in Toronto.

The tip openings of the fangs in most venomous snakes are directed downward, Mr. Bogert said. However, in the three "spitting" cobras, the openings are on the front side of the fang, near the tip,

so that a jet of venom can be thrown straight forward, presumably at the face of a threatening enemy. This, however, does not interfere with the use of the fangs for their normal purpose, which is to catch prey, at the same time paralyzing it with an injection of poison.

Mr. Bogert demonstrated the operation of these specialized fangs experimentally. He used museum specimens, carefully cleaned and attached to a hypodermic syringe. When pressure was applied, a jet of water was thrown forward from the tip openings. Cobras of the "spitting" species, in glass-fronted cages in the zoo, were also provoked to throw their venom. They were able to project it so forcibly and in such quantity that it was heard to strike the glass plate at a distance of five feet.

There are three known species of "spitting" cobras, two in Africa and one in Asia.

*Science News Letter, September 21, 1940*

A government biologist has listed 200,000 different local names given to birds of the United States.

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### Revised Values

**B**RUSHY patches on odd corners of a farm, bushes and vines along the fencerows, used to be considered sure signs of thriftlessness and slack farming. A farmer who would tolerate blackberries or hazelbrush on a hillside, or thickets of sumac or wild plum, was looked upon by his neighbors as little if at all better than one who would tolerate weeds in his cornfield. Brush, frequently sign of poor soil, was regarded as always a sign of bad farming.

Times are changing. Pitilessly clean cultivation along ruler-straight rows is becoming known as an invitation to erosion when it rains hard. A bit of a thicket here and there, where the land sags, may prevent the formation of a cancerous gully. Bushes are coming to be recognized as natural growths in a hillside pasture that is more or less stony anyway.

But above all, it is beginning to be borne home to landowners that there may be actual material benefits in the thickets. These areas of brush and small trees (yes, and even a few weeds, perhaps) are natural shelters for upland game birds like bobwhite and pheasant, for rabbits and other small meat animals, for fur-bearers like skunk and weasel and raccoon.

Once upon a time these creatures were just the careless bounty of nature. They were everywhere, in great-granddad's day, some of them so abundant as to be downright nuisances. If you wanted a mess o' quail you just took out the old muzzle-loading shotgun and got them, asking nobody's license or permit and taking all you wanted. There were always plenty left for the next time.

But hunters multiplied, guns became quicker-shooting, and worst of all, land had to be cultivated to the last foot to

meet rising taxes, increasing debts, standards of living that demanded higher cash incomes. So while the game was hunted nigh to extinction, its pitiful shelters were at the same time cut down and grubbed up and burned away. No place left for a rabbit to hide, for a hen bobwhite to make her nest. Game counts dropped alarmingly.

Now, with their value enhanced by scarcity, game birds and mammals have become a distinct asset, either for the farmer's own hunting or for well-paid permission to city folks. So many a landowner now is planting bushes where his father grubbed them up.

*Science News Letter, September 21, 1940*

### RADIO

## Rotating Color Filter Is Heart of CBS Television

**A** ROTATING color filter is the heart of the new Columbia Broadcasting System color television apparatus which had its full explanation and demonstration on Sept. 17 before the National Television Systems Committee.

Earlier two private showings have demonstrated the effectiveness of the new televising in color. The method devised

## RADIO

Games Slayter, vice-president in charge of research, Owens-Corning Fiberglas Corp., will describe some of the unusual uses for glass as guest scientist on "Adventures in Science" with Watson Davis, director of Science Service, over the coast to coast network of the Columbia Broadcasting System, Thursday, Sept. 26, 4:00 p.m.; EDST, 3:00 EST, 2:00 CST, 1:00 MST, 12:00 PST.

Listen in on your local station. Listen in each Thursday.

by Dr. Peter C. Goldmark, chief television engineer for CBS, uses only one communication channel, the same as ordinary black-and-white television. Receivers need little change in order to receive color and receivers not color-equipped can receive black-and-white pictures over the same transmission.

The Goldmark scheme is to pick up and transmit successively what is seen through red, green and blue filters and then recombine the different colors in the receiver.

Older systems have generally had to use three communication channels to accomplish the same objective, one for each primary color.

*Science News Letter, September 21, 1940*

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# •First Glances at New Books

## BIOLOGY

**THE MICROSCOPIC WORLD**—Frank Thone—*Messner*, 245 p., \$3. The biological editor of *Science Service* and the *Science News Letter's* nature Rambler takes us down the tube of the microscope to the part of the universe most of us never see. We are proud of this book and SNL readers will want to read its more than a score of chapters and see its ample illustrations. The chapter headings will give you a taste of the book: Seeing the Unseen, Invisible Lives, What are Microbes?, They're Just Everywhere!, They Do the Strangest Things!, Digestion Without Stomachs, Not All Are Single-Celled, They All Had Parents, Many Had Two Parents, Sizes and Shapes, The World's Strangest Zoo, They Aren't "Simple", Pastures of the Sea, Threads of Destruction, Bread and Beer, Microbial Farms, Messengers of Death, Messengers of Health, Micro-Sociology, Garden of Germs, Beyond the Microscope, New Frontiers.

*Science News Letter, September 21, 1940*

## NATURAL HISTORY

**SNIFFY, The Story of a Skunk**—David M. Stearns; illus. by Sharon Stearns—*Farrar & Rinehart*—62 p., illus., \$1. Justice is done to a most attractive animal in this most attractive little book for junior readers. The usefulness and essential harmlessness of the skunk are compellingly presented. Every other page is an illustration.

*Science News Letter, September 21, 1940*

## PHOTOGRAPHY

**CAMERA, TAKE THE STAND!**—Asa S. Herzog and A. J. Ezickson—*Prentice-Hall*, 195 p., illus., \$3. Lawyer and newspaper photo editor have put their heads together to produce a readable account of the many ways in which the camera serves law enforcement and justice.

*Science News Letter, September 21, 1940*

## ZOOLOGY

**A REVISION OF THE BLACK BASSES (MICROPTERUS AND HUPO) WITH DESCRIPTIONS OF FOUR NEW FORMS**—Carl L. Hubbs and Reeve M. Bailey—*Univ. of Michigan Press*, 51 p., 6 pl., 75c. (Misc. Pub., Museum of Zoology, No. 48)

*Science News Letter, September 21, 1940*

## ZOOLOGY

**A CONTRIBUTION TO THE HERPETOLOGY OF THE ISTHMUS OF TEHUANTEPEC. IV**—Norman Hartweg and James A. Oliver

—*Univ. of Michigan Press*, 31 p., 35c. (Misc. Pub., Museum of Zoology, No. 47)

*Science News Letter, September 21, 1940*

## BOTANY

**HOW TO KNOW THE TREES**—H. E. Jaques — *Published by author, Mt. Pleasant, Iowa*, 152 p., illus., spiral, \$1, cloth, \$1.80. A compact, simple, clearly worked out key to the common species of trees, cleanly illustrated with small, pertinent line cuts giving critical identification characters, with inset thumbnail maps showing distribution. Those who are already acquainted with the author's *Wild Things: How to Know Them* and *How to Know the Insects* will appreciate this new companion volume.

*Science News Letter, September 21, 1940*

## MEDICINE—PUBLIC HEALTH

**YOUR HEALTH, A Guide to the Medicine and Public Health Building at the New York World's Fair 1940**—*American Museum of Health*, 95 p., illus., 25c. This book serves a double purpose. Useful as a guide for a first visit to the exciting exhibits within the Medicine and Public Health Building at the New York World's Fair 1940, it will be equally useful later for refreshing the visitor's memory of what he has seen or suggesting where he can learn more about the fight for life and health.

*Science News Letter, September 21, 1940*

## ARCHAEOLOGY

**ARCHEOLOGICAL REMAINS IN THE WHITEWATER DISTRICT, EASTERN ARIZONA, Part II, Artifacts and Burials**—Frank H. H. Roberts, Jr.—*Govt. Print. Off.*, 170 p., illus., 50c. See SNL, Sept. 14, p. 168.

*Science News Letter, September 21, 1940*

## ORNITHOLOGY

**CHECK-LIST OF BIRDS OF THE WORLD, Vol. IV**—James Lee Peters—*Harvard Univ. Press*, 291 p., \$4. Fourth volume of a set that will be invaluable to the serious ornithologist.

*Science News Letter, September 21, 1940*

## MEDICINE

**BEHIND THE SURGEON'S MASK**—James Harpole—*Stokes*, 308 p., \$2.75. All of the drama and some of the science in a surgeon's practice are given in this book which will undoubtedly prove entertaining to many readers.

*Science News Letter, September 21, 1940*

## BIOLOGY

**PRINCIPLES OF ANIMAL BIOLOGY**—Lancelot Hogben—*Norton*, 415 p., \$3.75. A college text by one of the best known of present-day English scientists. Although Prof. Hogben has written brilliantly on a score of topics ranging from mathematics to politics, biology after all is his "home" subject, and this book adequately demonstrates his command of the facts and their presentation.

*Science News Letter, September 21, 1940*

## SOCIOLOGY

**FOLKWAYS, A study of the sociological importance of usages, manners, customs, mores, and morals**—William Graham Sumner—*Ginn*, 692 p., \$4. See page 183.

*Science News Letter, September 21, 1940*

## ZOOLOGY

**AN ATLAS OF THE FROG**—Paul L. Carroll and Wilfred F. Horner—*Mosby*, 109 p., illus., \$1.25. Worksheets for the laboratory, loose, punched for ring notebooks.

*Science News Letter, September 21, 1940*

## PUBLIC HEALTH—MEDICINE

**THE PUBLIC HEALTH NURSE AND HER PATIENT**—Ruth Gilbert—*Commonwealth Fund*, 396 p., \$2.25. The author, who has had training and experience both as public health nurse and as psychiatric social worker, has written here a book which should help public health nurses attain a "state of mind" which will help them to understand their own reaction toward their work and also the emotional problems and difficulties of patients and their families. The result should be more efficient and effective nursing.

*Science News Letter, September 21, 1940*

## FISHERIES

**FISH PRODUCTION**—Josephine Perry—*Longmans, Green*, 104 p., illus., \$1.50. Clear and simple account of how fish are caught and marketed. Should be useful for collateral reading in schools, as well as informative for the general reader.

*Science News Letter, September 21, 1940*

## ANATOMY

**NOTES ON THE ANATOMY OF THE BABIRUSA**—D. Dwight Davis—*Field Museum of Natural History*, 48 p., illus., 50c. A detailed study of the anatomy of one of the most incredible-looking of wild pigs; it will interest comparative anatomists.

*Science News Letter, September 21, 1940*